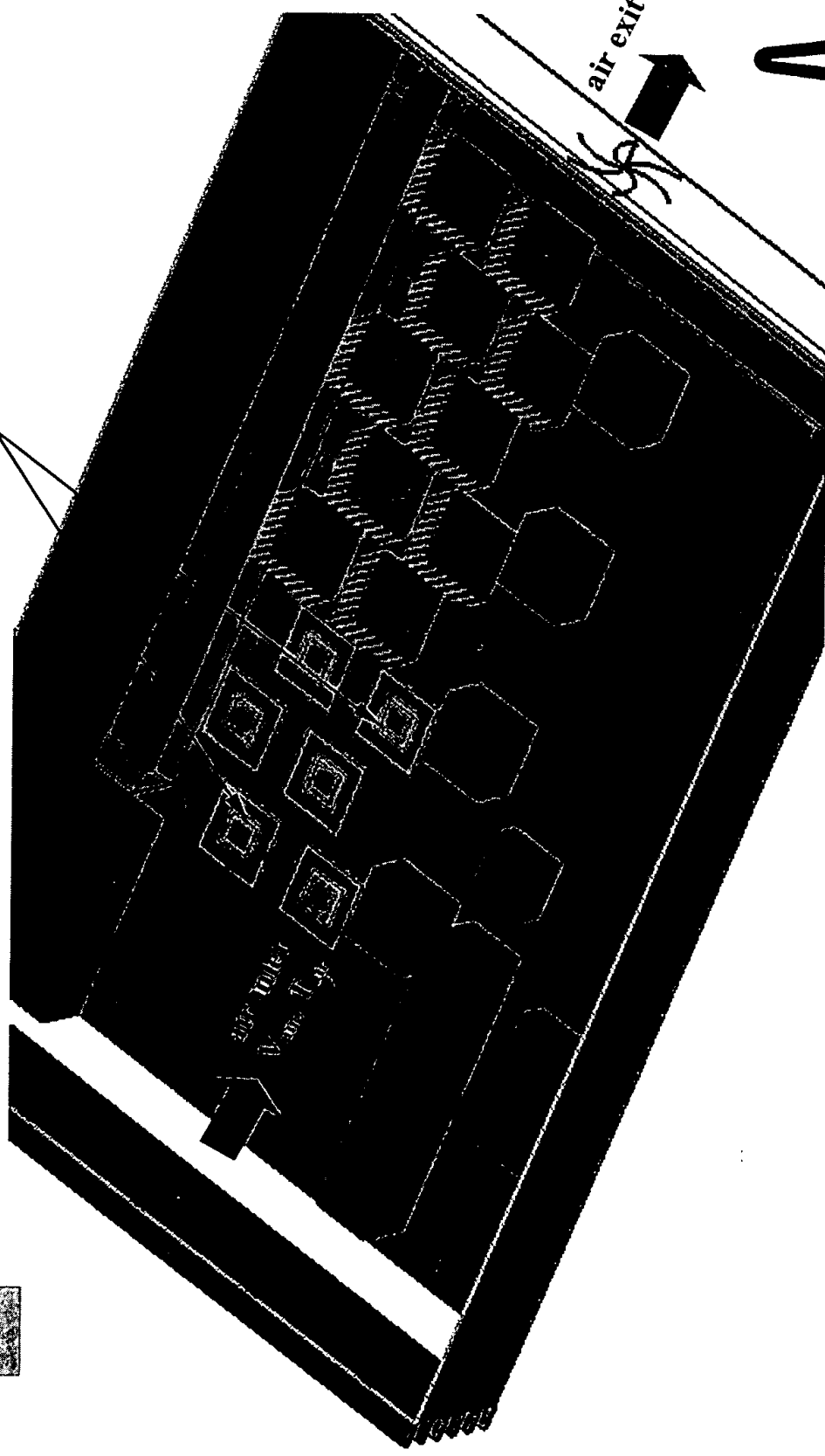


Fine-Tuning of Thermal Design

- Purpose: taking advantage of low θ_{ja} values of TBGA package
- Method: removing heat sinks for upstream TBGAs



Summary

• IC Package Thermal Data

- θ_{ja} value provide comparison between packages
- θ_{jb} and θ_{jc} values represent package internal thermal resistances

• IC Package Thermal Enhancement Design

- Minimization of θ_{jb} and θ_{jc}

JEDEC standards for Package Thermal Characterization

- still air and moving tests
- printed circuit boards for package thermal tests
- θ_{jb} measurement value depends on test board, thermal couple location, and board copper trace routing

Thermal Modeling of Packages

- CFD based simulations account for all heat transfer modes
- Heat conduction based simulations assume heat transfer rates on package and test board surfaces
- Modeling methods for IC package junction-to-board and junction-to-case thermal resistances